

**Claims:**

1. A method of measuring performance parameters of an imaging device, said method comprising the steps of:
  - maintaining a test pattern image, said test pattern image comprising alignment
  - 5 features and image analysis features;
  - imaging a test chart using said imaging device to form a second image, said test chart containing a representation of said test pattern image;
  - registering said test pattern image and said second image using region based matching operating on said alignment features; and
  - 10 measuring said performance parameters by analysing said image analysis features.
2. The method as claimed in claim 1 wherein said imaging device is a camera, and said test chart is a self-luminous device displaying said test pattern image.
- 15 3. A method of measuring performance parameters of a printer, said method comprising the steps of:
  - maintaining a test pattern image, said test pattern image comprising alignment
  - features and image analysis features;
  - printing said test pattern image using said printer to form a test chart;
  - 20 imaging said test chart using a calibrated imaging device to form a second image;
  - registering said test pattern image and said second image using region based matching operating on said alignment features; and
  - measuring said performance parameters by analysing said image analysis features.

4. The method as claimed in any one of claims 1 to 3, wherein different colour channels in said test pattern image and said second image are separately registered and analysed.
- 5 5. The method as claimed in any one of claims 1 to 4, wherein said region based mapping uses overlapping blocks of image data from said test pattern image and said second image.
6. The method as claimed in any one of claims 1 to 5, wherein said analysis features  
10 are said alignment features.
7. The method as claimed in any one of claims 1 to 6 wherein said region based matching is block based correlation.
- 15 8. The method as claimed in any one of claims 1 to 6 wherein said registering step comprises the sub-steps of:
- performing block based correlation on said test pattern image and said second image to determine a displacement map for mapping pixels of said test pattern image to corresponding pixels of said second image;
- 20       interpolating said displacement map to form a distortion map; and
- warping said test pattern image using said distortion map.
9. The method as claimed in any one of claims 1 to 8 wherein said analysing step includes comparing pixel values of corresponding pixels in said test pattern image and  
25 second image after said images have been registered.

10. The method as claimed in any one of claims 1 to 9 wherein said test pattern image is generated by the steps of:
- (a) dividing an image area into a predetermined number of areas;
  - 5 (b) dividing each of said areas into smaller areas;
  - (c) within each area, assigning properties to at least one of said smaller areas, and designating the remainder of said smaller areas as areas;
  - (d) generating pixel values for said at least one of said smaller areas, said pixel values being in accordance with said properties;
  - 10 (e) repeating steps (b) to (d).
11. The method as claimed in claim 10, wherein said properties are randomized.
12. The method as claimed in claim 10 or 11, wherein said at least one of said smaller  
15 areas is selected randomly.
13. The method as claimed in any one of claims 10 to 12, wherein said properties are one or more of:
- colour;
  - 20 slowly varying colour;
  - pattern with predetermined frequency distribution;
  - pattern with predetermined orientations; and
  - pseudo-random noise.
- 25 14. A method of generating a test pattern, said method comprising the steps of:

- (a) dividing an image area into a predetermined number of areas;
- (b) dividing each of said areas into smaller areas;
- (c) within each area, assigning properties to at least one of said smaller areas, and designating the remainder of said smaller areas as areas;
- 5 (d) generating pixel values for said at least one of said smaller areas, said pixel values being in accordance with said properties;
- (e) repeating steps (b) to (d).

15. The method as claimed in claim 14, wherein said properties are randomized.
- 10 16. The method as claimed in claim 14 or 15, wherein said at least one of said smaller areas is selected randomly.
17. The method as claimed in any one of claims 14 to 16, wherein said properties are
- 15 one or more of:
- colour;
  - slowly varying colour;
  - pattern with predetermined frequency distribution;
  - pattern with predetermined orientations; and
  - 20 pseudo-random noise.
18. A method of analysing images, said method comprising the steps of:
- receiving first and second images, said second image being a distorted version of said first image;
  - 25 labelling pixels of said first image with pixel labels;

determining distortion parameters for aligning said first image with said second image;

warping at least said pixel labels using said distortion parameters; and

associating said pixel labels with corresponding pixels in said second image,

5 wherein said labels provide information on a state of pixels in said second image before distortion.

19. The method as claimed in any one of claims 10 to 18 wherein said test pattern is a dyadic test pattern.

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20. Apparatus for measuring performance parameters of an imaging device, said apparatus comprising:

means for maintaining a test pattern image, said test pattern image comprising alignment features and image analysis features;

15 means for receiving a second image, said second image being an image captured by said imaging device of a test chart, and said test chart containing a representation of said test pattern image;

means for registering said test pattern image and said second image using region based matching operating on said alignment features; and

20 means for measuring said performance parameters by analysing said image analysis features.

21. Apparatus for measuring performance parameters of a printer, said apparatus comprising:

means for maintaining a test pattern image, said test pattern image comprising alignment features and image analysis features;

said printer for printing said test pattern image to form a test chart;

a calibrated imaging device for imaging said test chart to form a second image;

5 means for registering said test pattern image and said second image using region based matching operating on said alignment features; and

means for measuring said performance parameters by analysing said image analysis features.

10 22. Apparatus for generating a test pattern, said apparatus comprising:

means for dividing an image area into a predetermined number of areas;

means for dividing each of said areas into smaller areas;

means for assigning properties to at least one of said smaller areas within each area and designating the remainder of said smaller areas as areas;

15 means for generating pixel values for said at least one of said smaller areas, said pixel values being in accordance with said properties;

means for repeatedly passing control to said means for dividing each of said areas, said means for assigning properties, and said means for generating pixel values.

20 23. Apparatus for analysing images, said apparatus comprising:

means for receiving first and second images, said second image being a distorted version of said first image;

means for labelling pixels of said first image with pixel labels;

25 means for determining distortion parameters for aligning said first image with said second image;

means for warping at least said pixel labels using said distortion parameters; and

means for associating said pixel labels with corresponding pixels in said second image, wherein said labels provide information on a state of pixels in said second image before distortion.

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24. A computer readable medium comprising a computer program for measuring performance parameters of an imaging device, said computer program when executed on a computing device performs the steps of:

maintaining a test pattern image, said test pattern image comprising alignment  
10 features and image analysis features;

imaging a test chart using said imaging device to form a second image, said test chart containing a representation of said test pattern image;

registering said test pattern image and said second image using region based matching operating on said alignment features; and

15 measuring said performance parameters by analysing said image analysis features.

25. A computer readable medium comprising a computer program for measuring performance parameters of a printer, said computer program when executed on a computing device performs the steps of:

20 maintaining a test pattern image, said test pattern image comprising alignment features and image analysis features;

printing said test pattern image using said printer to form a test chart;

imaging said test chart using a calibrated imaging device to form a second image;

registering said test pattern image and said second image using region based

25 matching operating on said alignment features; and



measuring said performance parameters by analysing said image analysis features.

26. A computer readable medium comprising a computer program for generating a test pattern, said computer program when executed on a computing device performs the steps
- 5 of:
- (a) dividing an image area into a predetermined number of areas;
  - (b) dividing each of said areas into smaller areas;
  - (c) within each area, assigning properties to at least one of said smaller areas, and designating the remainder of said smaller areas as areas;
  - 10 (d) generating pixel values for said at least one of said smaller areas, said pixel values being in accordance with said properties;
  - (e) repeating steps (b) to (d).

27. A computer readable medium comprising a computer program for analysing
- 15 images, said computer program when executed on a computing device performs the steps of:

receiving first and second images, said second image being a distorted version of said first image;

labelling pixels of said first image with pixel labels;

- 20 determining distortion parameters for aligning said first image with said second image;

warping at least said pixel labels using said distortion parameters; and

- associating said pixel labels with corresponding pixels in said second image, wherein said labels provide information on a state of pixels in said second image before
- 25 distortion.



28. A method of measuring performance parameters of an imaging device, said method being substantially as herein described with reference to the accompanying drawings.

5 29. A method of generating a test pattern, said method being substantially as herein described with reference to Fig. 12B of the accompanying drawings.

30. A method of analysing images, said method being substantially as herein described with reference to the accompanying drawings.

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31. Apparatus for measuring performance parameters of an imaging device, said apparatus being substantially as herein described with reference to the accompanying drawings.

15 32. Apparatus for generating a test pattern, said apparatus being substantially as herein described with reference to Fig. 12B of the accompanying drawings.

33. Apparatus for analysing images, said apparatus being substantially as herein described with reference to the accompanying drawings.

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